PATENT ABSTRACTS OF JAPAN

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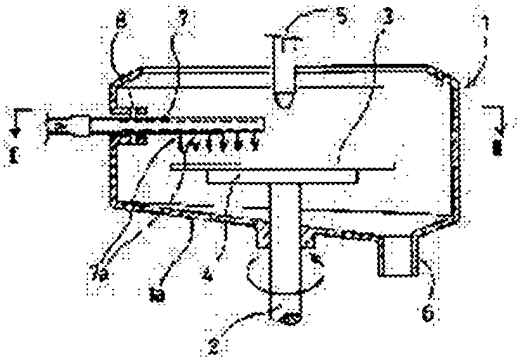
(54) SEMICONDUCTOR WAFER CLEANING AND DRYING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To remove wash water through evaporation by heating the water, by applying a centrifugal force to the water, and so on, by providing a blow pipe for blowing an inert gas such as nitrogen gas, etc., upon the surface of a semiconductor wafer above a semiconductor wafer placing section.



SOLUTION: A vertical shaft 2 which is rotated by means of a motor, etc., is inserted into a cover container 1 having an opened top through a bottom plate 1a of the container 1 and a vacuum suction type spin chuck 4 is attached to the upper end of the shaft 2. Above the spin chuck 4, an injection nozzle 5 is provided for spraying wash water such as pure water, etc., upon the surface of a semiconductor wafer 3 placed on the chuck 4. On the other hand, a blow pipe 7 through which an inert gas such as nitrogen gas, etc., is blown upon the surface of the wafer 3 is extended toward the central part of the wafer 3 from the outside of the wafer 3, and the base-side end of the pipe 7 is pivotally attached to the internal surface of the container 1 so that the pipe 7 may be rotated freely by means of a pin section 8.

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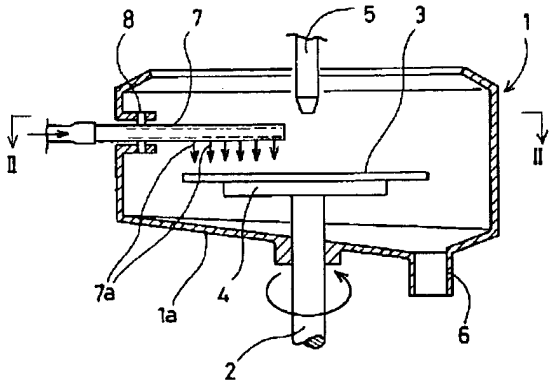
(54)【発明の名称】　半導体ウエハーの洗浄・乾燥装置

(57)【要約】
【課題】　半導体ウエハー３の表面を、カバー容器１の内において回転しながら噴出ノズル５から洗浄水を散布することで洗浄したのち乾燥する場合に、前記半導体ウエハーの表面に乾燥染みが発生することを回避する。
【手段】　前記の洗浄に相前後して、前記半導体ウエハー３の表面に、ブロー管７から窒素ガス等の不活性ガスをブローする。



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【特許請求の範囲】
【請求項１】上面を開放したカバー容器内に、回転する縦軸を、当該カバー容器の底板を貫通して挿入し、この縦軸の上端に半導体ウエハーの載置部を設け、この半導体ウエハー載置部の上方に、前記半導体ウエハーの表面に対する洗浄水の噴出ノズルを配設して成る洗浄・乾燥装置において、
前記半導体ウエハー載置部の上方に、前記半導体ウエハーの表面に対する窒素ガス等の不活性ガスの噴出ノズルを配設したことを特徴とする半導体ウエハーの洗浄・乾燥装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、半導体ウエハーにおいて、その表面の洗浄と、乾燥とを行う装置に関するものである。
【０００２】
【従来の技術】一般に、半導体ウハエーを使用して集積回路チップを製作するに際しては、前記半導体ウエハーの表面に対して各種の膜形成のような各種の表面加工を施した都度、その表面を洗浄したのち乾燥することが必要であるが、洗浄・乾燥を行うための一つの装置に、上端に半導体ウエハーを水平にして載置した縦軸を、上面を開放したカバー容器内に、当該カバー容器の底板を貫通して挿入し、前記半導体ウエハーを縦軸にて回転しながらその表面を、当該表面に散布した洗浄水を園遠心力で周囲に振り飛ばしながら洗浄したのち乾燥するように構成したものがある。
【０００３】
【発明が解決しようとする課題】しかし、この従来の洗浄・乾燥装置は、その洗浄・乾燥を大気中において行うものであることにより、洗浄に際して半導体ウエハーの表面に付着した水分が加熱蒸発及び遠心力等にて除去されるまでの間に大気中の酸素を吸収することによって、半導体ウエハーの表面に乾燥染みが発生すると言う問題があった。
【０００４】この問題を解消するには、前記の洗浄・乾燥装置におけるカバー容器を密閉型にすると共に、当該内部を窒素ガス等の不活性ガスの雰囲気にすれば良いが、カバー容器を密閉型にすることは、当該カバー容器内への半導体ウエハーの出し入れがきわめて面倒になるばかりか、窒素ガス等の不活性ガスの使用量が多くなると言う問題がある。
【０００５】本発明は、これらの問題を解消した洗浄・乾燥装置を提供することを技術的課題とするものである。
【０００６】
【課題を解決するための手段】この技術的課題を達成するため本発明は、「上面を開放したカバー容器内に、回転する縦軸を、当該カバー容器の底板を貫通して挿入し、この縦軸の上端に半導体ウエハーの載置部を設け、この半導体ウエハー載置部の上方に、前記半導体ウエハーの表面に対する洗浄水の噴出ノズルを配設して成る洗浄・乾燥装置において、前記半導体ウエハー載置部の上方に、前記半導体ウエハーの表面に対する窒素ガス等の不活性ガスのブロー管を配設する。」と言う構成にした。

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【０００７】
【発明の作用・効果】この構成において、半導体ウエハーを回転しながらその表面に対して洗浄水の散布とする洗浄が完了すると、これと略同時か、又は、その完了に相前後して、前記半導体ウエハーの表面に対して、ブロー管から窒素ガス等の不活性ガスをブローすることにより、前記半導体ウエハーの表面を、窒素ガス等の不活性ガスの雰囲気にして、大気中に酸素との接触を阻止した状態のもとで、洗浄水を加熱蒸発及び遠心力等にて除去することができるのであり、また、前記窒素ガス等の不活性ガスは、ブロー管にて半導体ウエハーの表面にブローするだけで良いから、この窒素ガス等の不活性ガスの使用量は少なくて済むのである。
【０００８】従って、本発明によると、半導体ウエハーに対する洗浄・乾燥に際して、その表面に乾燥染みが発生することを、当該半導体ウエハーのカバー容器内への出し入れが容易にでき、且つ、窒素ガス等の不活性ガスの使用量を少なくした状態のもとで、確実に低減できる効果を有する。
【０００９】
【発明の実施の形態】以下、本発明の実施の形態を、図１及び図２の図面について説明する。この図において符号１は、上面を開放したカバー容器を示し、このカバー容器１の内部には、図示しないモータ等にて回転する縦軸２が、カバー容器１の底板１ａを貫通して挿入され、この縦軸２の上端には、半導体ウエハー３を水平にして載置する真空吸着式のスピンチャック４が取付けられている。
【００１０】このスピンチャック４の上方には、当該スピンチャック４の上面に載置した前記半導体ウエハー３の表面に対して純水等の洗浄水を散布するための噴出ノズル５が配設される一方、前記カバー容器１における底板１ａには、洗浄水の排出口６が設けられている。符号７は、前記半導体ウエハー３の表面に対して窒素ガス等の不活性ガスをブローするためのブロー管を示し、このブロー管７は、前記半導体ウエハー３の外側から半導体ウエハー３の略中心に向かって延びて、その基端部を前記カバー容器１の内面に対してピン部８にて回転自在に枢着することにより、半導体ウエハー３の上部の位置（この位置を、図２に実線で示す）と、半導体ウエハー３の外周方向に離れた位置（この位置を、図２二点鎖線で示す）との間を往復動するように構成され、このブロー管７には、複数個のガス噴出口７ａが列状に穿設され

ている。

【００１１】この構成において、ブロー管７を、図２に二点鎖線で示すように、外側に離れた位置にした状態で、縦軸２の上端におけるスピンチャック４の上面に、半導体ウエハー３を載置したのち、この半導体ウエハー３を回転しながらその表面に噴出ノズル５から洗浄水を散布することにより、半導体ウエハー３の表面を洗浄する。

【００１２】この洗浄が完了すると、これと略同時か、又は、その完了に相前後して、前記ブロー管７を、図２に実線で示すように、半導体ウエハー３の上部の位置して、このブロー管７から半導体ウエハー３の表面に対して窒素ガス等の不活性ガスをブローすることにより、前記半導体ウエハー３の表面を、窒素ガス等の不活性ガスの雰囲気にして、大気中に酸素との接触を阻止した状態のもとで、洗浄水を加熱蒸発及び遠心力等にて除去することができるのである。

【００１３】この場合において、窒素ガス等の不活性ガスは、ブロー管にて半導体ウエハーの表面にブローするだけで良いから、前記カバー容器を密閉型にして、この内部に不活性ガスを充満する場合よりも、不活性ガスを使用量を少なくできる一方、カバー容器に対する半導体ウエハーの出し入れも容易にできるのである。なお、前

記ブロー管７を、前記したように、半導体ウエハー３の外側から半導体ウエハー３の略中心に向かって延びたものにして、これに複数個のガス噴出口７ａを列状に穿設したものに構成することにより、半導体ウエハーの表面における全体に対して不活性ガスを略均一に供給できるから、不活性ガスの使用量をより低減できるのであり、また、このブロー管７を、半導体ウエハー３の上部の位置（この位置を、図２に実線で示す）と、半導体ウエハー３の外周方向に離れた位置（この位置を、図２二点鎖線で示す）との間を往復動するように構成することにより、半導体ウエハー３のスピンチャック４に対する着脱に際して、当該ブロー管７が邪魔になることを回避できるのである。

【図面の簡単な説明】

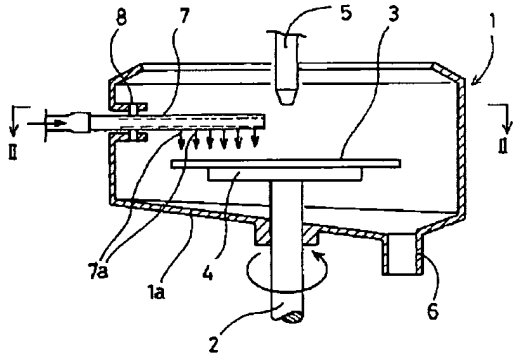
【図１】本発明の実施の形態を示す縦断正面図である。

【図２】図１のII－II視平断面図である。

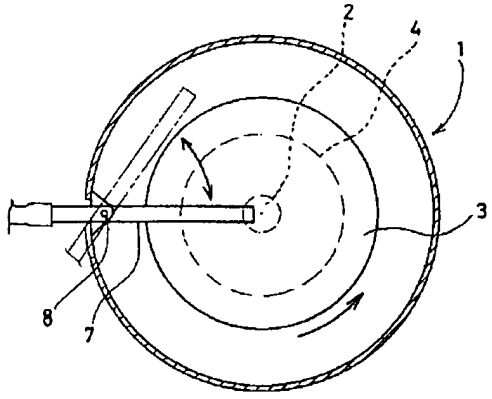
【符号の説明】

1	カバー容器
2	縦軸
3	半導体ウエハー
4	スピンチャック
5	洗浄水の噴出ノズル
7	不活性ガスのブロー管

【図１】



【図２】



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the equipment which performs washing of the front face, and desiccation in a semi-conductor wafer.
[0002]
[Description of the Prior Art] Although to dry after washing the front face is required whenever it generally faced manufacturing an integrated circuit chip using semi-conductor UHAE and performed various kinds of surface treatment like various kinds of film formation to the front face of said semi-conductor wafer The axis of ordinate which leveled the semi-conductor wafer and laid it in one equipment for performing washing and desiccation at upper limit The bottom plate of the covering container concerned is penetrated and inserted into the covering container which opened the top face wide, and there are some which were constituted so that it might dry, after washing shaking off at a perimeter the wash water which sprinkled the front face on the front face concerned while rotating said semi-conductor wafer with the axis of ordinate with a garden centrifugal force.
[0003]
[Problem(s) to be Solved by the Invention] However, this the conventional washing and dryer had the problem said that a desiccation stain occurs in the front face of a semi-conductor wafer by absorbing the oxygen in atmospheric air, by the time the moisture which adhered to the front face of a semi-conductor wafer on the occasion of washing is removed with heating evaporation, a centrifugal force, etc. by being what performs its washing and desiccation into atmospheric air.
[0004] Although what is necessary is just to make the interior concerned into the ambient atmosphere of inert gas, such as nitrogen gas, while using the covering container in the aforementioned washing and dryer as closed mold in order to solve this problem, using a covering container as closed mold has the problem which receipts and payments of the semi-conductor wafer into the covering container concerned say that the amount of the inert gas used, such as about [becoming very troublesome] and nitrogen gas, increases.
[0005] This invention makes it a technical technical problem to offer washing and the dryer which solved these problems.
[0006]
[Means for Solving the Problem] In order to attain this technical technical problem, this invention in the covering container which opened "top face wide Penetrate the bottom plate of the covering container concerned, insert the axis of ordinate to rotate, and the installation section of a semi-conductor wafer is prepared in the upper limit of this axis of ordinate. in washing and the dryer which arranges the jet nozzle of the wash water to the front face of said semi-conductor wafer above this semi-conductor wafer installation section, and grows into it, the blow off pipe of inert gas, such as nitrogen gas to the front face of said semi-conductor wafer, is arranged above said semi-conductor wafer installation section. It was made the configuration called ".
[0007]

[Function and Effect of the Invention] When washing considered as spraying of wash water to that front face is completed in this configuration, rotating a semi-conductor wafer, in this and abbreviation coincidence Just before or after the completion, to the front face of said semi-conductor wafer or by blowing inert gas, such as nitrogen gas, from a blow off pipe By the basis in the condition of having made the front face of said semi-conductor wafer into the ambient atmosphere of inert gas, such as nitrogen gas, and having prevented contact into oxygen in atmospheric air Since what is necessary is just to be able to remove wash water with heating evaporation, a centrifugal force, etc., and to blow inert gas, such as said nitrogen gas, on the front face of a semi-conductor wafer in a blow off pipe, there is little amount of the inert gas used, such as this nitrogen gas, and it ends.

[0008] Therefore, according to this invention, it has the effectiveness which can be reduced certainly by the basis in the condition of receipts and payments into the covering container of the semi-conductor wafer concerned could make it easy that a desiccation stain occurred on the front face on the occasion of washing and desiccation to a semi-conductor wafer, and having lessened the amount of the inert gas used, such as nitrogen gas.

[0009]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained about the drawing of drawing 1 and drawing 2 . The spin chuck 4 of the vacuum adsorption equation which the axis of ordinate 2 rotated by the motor which is not illustrated penetrates bottom plate 1a of the covering container 1 in the interior of this covering container 1, is inserted in it by a sign 1 showing the covering container which opened the top face wide, levels the semi-conductor wafer 3 in this drawing at the upper limit of this axis of ordinate 2, and is laid is attached.

[0010] While the jet nozzle 5 for sprinkling wash water, such as pure water, to the front face of said semi-conductor wafer 3 laid in the top face of the spin chuck 4 concerned is arranged above this spin chuck 4, the exhaust port 6 of wash water is formed in bottom plate 1a in said covering container 1. A sign 7 shows the blow off pipe for blowing inert gas, such as nitrogen gas, to the front face of said semi-conductor wafer 3. This blow off pipe 7 By extending toward the abbreviation core of the semi-conductor wafer 3 from the outside of said semi-conductor wafer 3, and pivoting the end face section free [rotation] in the pin section 8 to the inside of said covering container 1 It is constituted so that between the location (a continuous line shows this location to drawing 2) of the upper part of the semi-conductor wafer 3 and the locations (the drawing 2 two-dot chain line shows this location) distant in the direction of a periphery of the semi-conductor wafer 3 may be reciprocated, and two or more gas port 7a is drilled in this blow off pipe 7 by seriate.

[0011] In this configuration, as a two-dot chain line shows, where a blow off pipe 7 is made into drawing 2 in the outside distant location, after laying the semi-conductor wafer 3 in the top face of the spin chuck 4 in the upper limit of an axis of ordinate 2, the front face of the semi-conductor wafer 3 is washed by sprinkling wash water from the jet nozzle 5 on that front face, rotating this semi-conductor wafer 3.

[0012] When this washing is completed, in this and abbreviation coincidence Or just before or after the completion, to drawing 2 , as a continuous line shows, said blow off pipe 7 By locating the upper part of the semi-conductor wafer 3, and blowing inert gas, such as nitrogen gas, from this blow off pipe 7 to the front face of the semi-conductor wafer 3 The front face of said semi-conductor wafer 3 is made into the ambient atmosphere of inert gas, such as nitrogen gas, it is a basis in the condition of having prevented contact into oxygen in atmospheric air, and wash water can be removed with heating evaporation, a centrifugal force, etc.

[0013] In this case, since what is necessary is just to blow inert gas, such as nitrogen gas, on the front face of a semi-conductor wafer in a blow off pipe, said covering container is used as closed mold, and rather than the case where it is [interior / this] full of inert gas, while the amount used can be lessened, the receipts and payments of a semi-conductor wafer to a covering container can also make inert gas easy. In addition, by making it what was prolonged toward the abbreviation core of the semi-conductor wafer 3 from the outside of the semi-conductor wafer 3 as said blow off pipe 7 was described above, and constituting in what drilled two or more gas port 7a in this seriate Since inert gas can be supplied to

abbreviation homogeneity to the whole in the front face of a semi-conductor wafer The amount of the inert gas used can be reduced more. This blow off pipe 7 The location of the upper part of the semi-conductor wafer 3 (a continuous line shows this location to drawing 2), By constituting so that between the locations (the drawing 2 two-dot chain line shows this location) distant in the direction of a periphery of the semi-conductor wafer 3 may be reciprocated, it is avoidable that the blow off pipe 7 concerned becomes obstructive on the occasion of the attachment and detachment to the spin chuck 4 of the semi-conductor wafer 3.

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EFFECT OF THE INVENTION

[Function and Effect of the Invention] When washing considered as spraying of wash water to that front face is completed in this configuration, rotating a semi-conductor wafer, in this and abbreviation coincidence Just before or after the completion, to the front face of said semi-conductor wafer or by blowing inert gas, such as nitrogen gas, from a blow off pipe By the basis in the condition of having made the front face of said semi-conductor wafer into the ambient atmosphere of inert gas, such as nitrogen gas, and having prevented contact into oxygen in atmospheric air Since what is necessary is just to be able to remove wash water with heating evaporation, a centrifugal force, etc., and to blow inert gas, such as said nitrogen gas, on the front face of a semi-conductor wafer in a blow off pipe, there is little amount of the inert gas used, such as this nitrogen gas, and it ends.
[0008] Therefore, according to this invention, it has the effectiveness which can be reduced certainly by the basis in the condition of receipts and payments into the covering container of the semi-conductor wafer concerned could make it easy that a desiccation stain occurred on the front face on the occasion of washing and desiccation to a semi-conductor wafer, and having lessened the amount of the inert gas used, such as nitrogen gas.
[0009]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained about the drawing of drawing 1 and drawing 2 . The spin chuck 4 of the vacuum adsorption equation which the axis of ordinate 2 rotated by the motor which is not illustrated penetrates bottom plate 1a of the covering container 1 in the interior of this covering container 1, is inserted in it by a sign 1 showing the covering container which opened the top face wide, levels the semi-conductor wafer 3 in this drawing at the upper limit of this axis of ordinate 2, and is laid is attached.
[0010] While the jet nozzle 5 for sprinkling wash water, such as pure water, to the front face of said semi-conductor wafer 3 laid in the top face of the spin chuck 4 concerned is arranged above this spin chuck 4, the exhaust port 6 of wash water is formed in bottom plate 1a in said covering container 1. A sign 7 shows the blow off pipe for blowing inert gas, such as nitrogen gas, to the front face of said semi-conductor wafer 3. This blow off pipe 7 By extending toward the abbreviation core of the semi-conductor wafer 3 from the outside of said semi-conductor wafer 3, and pivoting the end face section free [rotation] in the pin section 8 to the inside of said covering container 1 It is constituted so that between the location (a continuous line shows this location to drawing 2) of the upper part of the semi-conductor wafer 3 and the locations (the drawing 2 two-dot chain line shows this location) distant in the direction of a periphery of the semi-conductor wafer 3 may be reciprocated, and two or more gas port 7a is drilled in this blow off pipe 7 by seriate.
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[0012] When this washing is completed, in this and abbreviation coincidence Or just before or after the

completion, to drawing 2 , as a continuous line shows, said blow off pipe 7 By locating the upper part of the semi-conductor wafer 3, and blowing inert gas, such as nitrogen gas, from this blow off pipe 7 to the front face of the semi-conductor wafer 3 The front face of said semi-conductor wafer 3 is made into the ambient atmosphere of inert gas, such as nitrogen gas, it is a basis in the condition of having prevented contact into oxygen in atmospheric air, and wash water can be removed with heating evaporation, a centrifugal force, etc.

[0013] In this case, since what is necessary is just to blow inert gas, such as nitrogen gas, on the front face of a semi-conductor wafer in a blow off pipe, said covering container is used as closed mold, and rather than the case where it is [interior / this] full of inert gas, while the amount used can be lessened, the receipts and payments of a semi-conductor wafer to a covering container can also make inert gas easy. In addition, by making it what was prolonged toward the abbreviation core of the semi-conductor wafer 3 from the outside of the semi-conductor wafer 3 as said blow off pipe 7 was described above, and constituting in what drilled two or more gas port 7a in this seriate Since inert gas can be supplied to abbreviation homogeneity to the whole in the front face of a semi-conductor wafer The amount of the inert gas used can be reduced more. This blow off pipe 7 The location of the upper part of the semi-conductor wafer 3 (a continuous line shows this location to drawing 2), By constituting so that between the locations (the drawing 2 two-dot chain line shows this location) distant in the direction of a periphery of the semi-conductor wafer 3 may be reciprocated, it is avoidable that the blow off pipe 7 concerned becomes obstructive on the occasion of the attachment and detachment to the spin chuck 4 of the semi-conductor wafer 3.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the vertical section front view showing the gestalt of operation of this invention.
[Drawing 2] It is II-II ********** of drawing 1 .
[Description of Notations]
1 [ ] Covering Container
2 [ ] Axis of Ordinate
3 [ ] Semi-conductor Wafer
4 [ ] Spin Chuck
5 [ ] Jet Nozzle of Wash Water
7 [ ] Blow Off Pipe of Inert Gas

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1] Into the covering container which opened the top face wide, penetrate the bottom plate of the covering container concerned and the axis of ordinate to rotate is inserted. In washing and the dryer which prepares the installation section of a semi-conductor wafer in the upper limit of this axis of ordinate, arranges the jet nozzle of the wash water to the front face of said semi-conductor wafer above this semi-conductor wafer installation section, and grows into it Washing and the dryer of the semi-conductor wafer characterized by arranging the jet nozzle of inert gas, such as nitrogen gas to the front face of said semi-conductor wafer, above said semi-conductor wafer installation section.

[Translation done.]